National Science Foundation
Directorate for Computer and Information Science and Engineering
Advisory Committee (CISE AC)

May 19-20, 2016

National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Meeting Summary

The spring meeting of the National Science Foundation's (NSF) Directorate for Computer and Information Science and Engineering (CISE) Advisory Committee (AC) was held at NSF on May 19-20, 2016.

Thursday, May 19, 2016

Welcome, Introductions, Review of Agenda, and Approval of Minutes
Drs. Francine "Fran" Berman (Rensselaer Polytechnic Institute) and David Culler (University of California, Berkeley), CISE AC co-chairs, opened the meeting at 12:30 p.m. After introductions of all those in attendance, Dr. Culler reviewed the meeting agenda and the CISE AC members unanimously approved the minutes from the December 2015 meeting.

NSF and CISE Update
Dr. Jim Kurose, Assistant Director of NSF for CISE, welcomed the AC members. He thanked Dr. Culler for his service as co-chair and announced Dr. Rob Rutenbar as the incoming co-chair for the next AC meeting in December 2016.

Dr. Kurose provided an update on recent activities for the agency and directorate (slides are posted on the CISE AC website). As part of this update, Dr. Kurose announced changes in CISE staff and provided an overview of the President's Fiscal Year 2017 Budget Request for NSF and CISE. Dr. Kurose also revisited five priorities discussed at previous AC meetings: cyberinfrastructure, smart and connected communities, CS undergraduate education, data science, and partnerships. He closed the session by presenting NSF's 10 "big ideas" for future investments.

Future Directions of NSF Advanced Computing Infrastructure (ACI): Meeting the growing demand for ACI in science and engineering
Ms. Irene Qualters, the Division Director for the CISE Division of Advanced Cyberinfrastructure (ACI), provided updates on NSF's advanced cyberinfrastructure activities. She noted the deployments of the Bridges (at the Pittsburgh Supercomputer Center) and Wrangler systems (at the University of Texas, Austin), and summarized the final report of the National Academies of Sciences, Engineering, and Medicine on *Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science in 2017-*

2020. She noted that the report was thoughtful and positive, offering helpful recommendations for which responses and actions were in development.

Discussion: The Challenges of Harnessing the Data Revolution
Dr. Rutenbar, co-chair of the CISE AC Subcommittee on Data Science, opened the discussion by describing the evolution of undergraduate education in the context of data science and asking about the role that CISE can play during this transition. He noted the importance of defining data science broadly, and the significant opportunity afforded by data science for enabling collaboration across disciplines. At the same time, Dr. Rutenbar raised the challenge of the interdisciplinary nature of data science, with respect to both research and education.

In addition, Dr. Berman led a conversation regarding CISE's role in supporting the cyberinfrastructure needs in order to harness data. AC members noted the need for sustainable strategies and collaborations spanning academia and industry to provision the long-term infrastructure necessary for furthering data science.

Artificial Intelligence and Machine Learning
Dr. Ed Felten, U.S. Deputy Chief Technology Officer at the White House Office of Science and Technology Policy, provided an overview of the development of a new federal strategy focused on U.S. leadership in the area of artificial intelligence.

Dr. Lynne Parker, Division Director for the CISE Division of Information and Intelligent Systems (IIS), joined via Skype to discuss trends and accomplishments from NSF-supported research in artificial intelligence and machine learning.

Friday, May 20, 2016

Welcome and Overview of Day
Drs. Berman and Culler opened the second day of the meeting at 9:00 a.m.

Computer Science Education: The rising demand for CISE and adapting computer science/computer engineering departments for the 21st-century university
Dr. Jan Cuny, Program Director for Education and Workforce in CISE, summarized NSF's education efforts. She highlighted the national Computer Science for All initiative launched in January 2016, noting that NSF is working collaboratively with other agencies to help realize the goal of this initiative to provide all K-12 students in the U.S. with the opportunity to take a computer science course. Dr. Cuny noted that improving curriculum and access to computer science courses in K-12 is essential for broadening participation in the discipline. She also highlighted some of NSF's efforts in undergraduate computer science education, including the REvolutionizing engineering and computer science Departments (RED) program. The education and workforce development working group of the CISE AC noted that they met prior to the meeting and look forward to a report from the Nation Academies of Sciences, Engineering, and Medicine expected by the end of the year.

Discussion: The Future of Computing Research: Industry-Academic Collaborations
Dr. Greg Hager, Chair of the Computing Community Consortium (CCC), provided an overview of a CCC survey, workshop, and [report](#) on industry-academic collaborations that included information about existing approaches as well as ideas for improving interactions. The AC members noted their agreement with the recommendations of the report, and Dr. Culler suggested that the CISE AC could draft a memo to express this support.

The discussion that followed was led by Drs. Culler and Peter Lee of the CISE AC and focused on how to create successful and sustained collaborations and embedded interactions spanning academia and industry. The importance of reusable intellectual property (IP) transfer vehicles and strategic education was also noted.

CISE AC Retiring Members' Reflections
Dr. Kurose thanked the retiring CISE AC members – Drs. Henrik Christensen, Susan Davidson, James Landay, and Jeffrey Vitter – several of whom offered short reflections about their time on the AC.

Preparation for Follow-Up Conversation with NSF Director
Drs. Berman and Culler encouraged all the AC members to reflect on the message(s) that they wished to convey to NSF leadership. The members were very supportive of the NSF Big Ideas, recognizing and appreciating the integration of computing within them. They also noted that the ubiquity of computing prompts a tremendous amount of responsibility, and that a paradigm shift is needed to enable U.S. colleges and universities to meet the growing demand for computer science.

Closing Remarks and Wrap-up
In closing, Drs. Berman and Culler thanked Dr. Kurose, CISE staff, and CISE AC members for a successful meeting.

The meeting adjourned at 12:30 p.m.

Appendix I: Attendance for May 19-20, 2016 CISE AC Meeting

AC Members Present:
Francine Berman, Rensselaer Polytechnic Institute
Thomas Cortina, Carnegie Mellon University
David Culler, University of California, Berkeley
Michael Franklin, University of California, Berkeley
Brent Hailpern, IBM Research – Almaden
Charles Isbell, Jr., Georgia Institute of Technology (*participated via teleconference 5/19*)
James Landay, University of Washington
Peter Lee, Microsoft Research
Margaret Martonosi, Princeton University (*participated 5/19*)
Padma Raghavan, Pennsylvania State University
Rob Rutenbar, University of Illinois at Urbana-Champaign
Bob Sproull, University of Massachusetts, Amherst
Victoria Stodden, Columbia University
Alex Szalay, The Johns Hopkins University

AC Members Absent:
Henrik Christensen, Georgia Institute of Technology
Susan Davidson, University of Pennsylvania
Deborah Estrin, Cornell Tech
Vijay Kumar, University of Pennsylvania
Craig Partridge, Raytheon BBN Technologies
Robert Schnabel, Indiana University
Jeffrey Vitter, University of Kansas